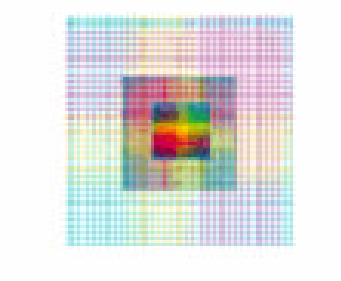

AUDIT II

Country Report

ROMANIA

Georgia Veziryianni
Harris Andreosatos
Final Report 10.12.2002

SUMMARY OF ENERGY AUDITING

The Romanian Authority in charge of defining the national energy policy and strategies is the Ministry of Industry and Resources.

The Romanian Government began its reform in 1990. As a first step for the commercialization of the Energy sector, it established a number of Regie Autonoma (RAs - state holding companies for sectors considered strategic), to manage energy activities. At present all RAs are transformed and split into commercial companies, which have the operational responsibility for the production and supply of energy products, and for support services and activities. These measures enabled the government to separate policy and regulation from operational functions, to bring accountability, and to institute commercial practices in the energy sector.

The main energy commercial companies will be soon privatised, as a necessary step for setting up market conditions in the Energy sector.

Energy efficiency policy-making and programme implementation is the responsibility of the Romanian Agency for Energy Conservation (ARCE). The Agency was established in April 1991 by Governmental Decree No.327, as a semi-autonomous agency. In 1994 its status was changed to Directorate of the former Ministry of Industry and Trade (MIT), under the co-ordination of the State Secretary for Energy.

ARCE's role is to co-ordinate the energy efficiency actions in all sectors of the economy and through technical and financial support, to develop and implement programmes encouraging energy efficiency. Its work is focused to four principal activities:

- Policy development;
- Award of investment grants;
- Granting of licenses for new energy auditors;
- Granting of licenses for new large energy consumers.

Energy Audit Programmes

At present, there is not any pure Energy Audit Programme at a national level in Romania. Nevertheless, energy audits – based on old legislation and technical prescriptions - are being carried out all over the country. A large number of institutions located in the main cities of Romania (many of which were under the status of R&D state owned institutes before 1989) are providing energy services including energy auditing and energy management.

Other Programmes with Energy Audits

There are not any Programmes with Energy Audits at a national level in Romania.

Other Activities including Energy Audits

A considerable number of national or European projects exist in Romania, carried out by governmental or non-governmental agencies and organisations, with co-operation of foreign countries. The projects described below, do not always refer immediately to Energy Audits, but they may include activities that are connected to energy audits.

1. Monitoring and Targeting in Key Industrial Sectors

The Monitoring and Targeting in Key Industrial Sectors was developed within the framework of **PHARE**, during the period 1998 – 1999. The co-ordination of the aforementioned project was done by the ***Romanian Agency for Energy Conservation (ARCE)***.

2. Schemes and Measures to Implement in Romania the Specific Energy Saving Long Term Agreements in Industry

The "Schemes and Measures to Implement in Romania the Specific Energy Saving Long Term Agreements in Industry" project was realised within the framework of **SAVE II**, during the period 1998 – 2000. The co-ordination of the aforementioned project was done by a large R&D institute in Bucharest, ICEMENERG and the ***Romanian Agency for Energy Conservation (ARCE)***.

The voluntary agreements (LTA - long term agreements) constitute a broad category of agreements, which include negotiated targets for achieving emission reductions, voluntary adoption of high-energy efficiency products or processes, co-operative R&D efforts and agreements to monitor and report emission reductions based on voluntary actions. They are generally agreements between government and industry in order to facilitate voluntary action and they are close in concept with voluntary ISO standards such as the Environmental Management System ISO 14000.

3. Energy Action Plan for Black Sea Region

The above project was developed within the framework of **SYNERGY** program, during the period: April 1995 - September 1997. More specifically, it was:

• Proposed in **1997** to the **Local Authorities** of Dolj, Gorj and Mehedinti Counties (Oltenia Region)

• Based on the study of the existing situation in the region

• Structured on: Short-term and Long-term Action Plans

4. PUBLIC - Energy Efficiency in Public and Municipal Buildings

The above project was developed within the framework of **ECOS-OUVERTURE - PHARE - Urban and Regional Energy Efficiency**, during the period January 1997 - April 1998. The content of the project is briefly described as follows: Six energy audits have been realised in the following buildings in the city of Craiova: Prefecture Palace of Dolj County, General School No.17 Romanesti, High School "Traian Vuia", Student Hostels of the Faculty of Agronomy, Sport Hall (Faculty of Physical Education), Elderly-house Craiova. Furthermore, 30 walk-through energy

audits have been realised at: 8 Schools and High Schools, 7 Universities, 4 Hospitals, 2 Culture & Sport Centers and 9 Public Administration buildings.

5. ENEFBALKO Initiative

The above project was developed within the framework of **PHARE Multi Country Networking / Twinning for Energy Efficient Organisations**, during the period April 1997 - April 1998.

6. Increase of SOCER energy auditing capacity

The above project was developed within the framework of **Five Years Development Assistance Program of Greek Government**, during the period January 1999-December 1999. The project was implemented by the Hellenic Agency for Local Development and Local Government – EETAA. For this project, **EETAA** allowed an important amount for the purchase of the specific equipment for electricity and heat measurements needed for the achievement of the energy audits of public and municipal buildings.

7. Development and Implementation of a System of Flexible Training Modules for Energy Auditors for Buildings, based on Competency Analysis and Vocational Qualification Profiles

The above project was developed within the framework of **LEONARDO DA VINCI**, during the period 1 December 1999 - 31 August 2001. The coordinator of the project was **UPB –** UNESCO Chair of University "Politechnica" of Bucharest.

8. Improvement of the Energy Efficiency and of the Ambient Conditions for Patients in a Large Hospital

The above project was developed within the framework of the program **ECOLINKS (USAID)**, during the period September 2000 – July 2001. In the framework of the project, the first technical step was the energy audit of the hospital. The project has been considered as a study case and the final conclusions have been disseminated to many other similar institutions from Romania.

9. SMEU - Urban Management Energy System

The above project was realised within the framework of the program **PHARE – FMAPL Program for Modernization of the Romanian Public Local Administration**, during the period September 2000 – May 2001. A **"municipal energy audit"** has been prepared for each of the 4 towns from Dolj County (Bailesti, Calafat, Segarcea, Filiasi). Models from ARCE (already experienced on large cities: Timisoara, Giurgiu etc.) have been used for the drawing-up of the studies.

10. Selection and promotion of appropriate energy efficiency measures in housing sector – ENERGYHOMES

The above project was realised within the framework of the program **SAVE II**, during the period 1997-2001

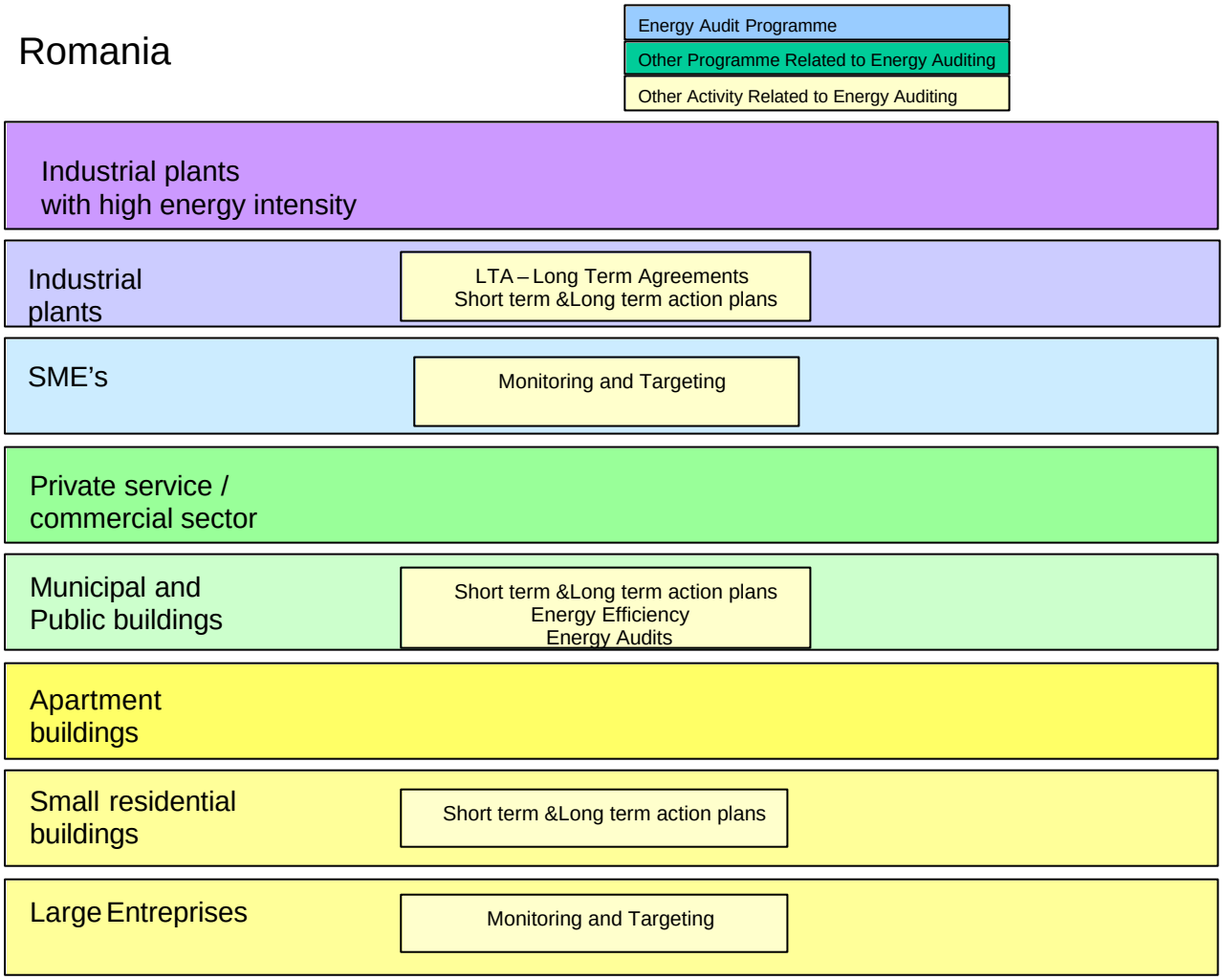

Figure 1: The Map of Energy Audits in Romania

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Country Report

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Disclaimer

The information contained in this report has been gathered from publicly available sources and through expert contacts. All efforts have been made to secure the veracity of the report, however the authors cannot fully guarantee the content.

THE COUNTRY REPORT

1. Background and Present National Energy Policy

1.1 Previous activities

From the beginning of '90s Romania's economy is in transition from central planning to market orientation and it is experiencing difficulties due to break of its traditional economic links, lack of investments and the sharp rise in the prices of energy resources.

Romania is a signatory of the Kyoto Protocol on Climate Change, and has undertaken to cut greenhouse gas emissions by 8% relative to 1989 levels by 2008-12. It has also ratified the Energy Charter Treaty, in August 1997.

In 1989 – 1999 the economy declined, the Gross Domestic Product (GDP) decreased with an average annual growth rate of 2.4 % and the average annual decrease of final energy consumption was about 4.9 %, which reflects the significant reductions in activity with high-energy intensity and also of the uneconomic sectors. The energy intensity of GDP related to final energy consumption decreased during the same period by 3.3% per year.

In 1989 – 1999 in general, the economy sectors of the country didn't show a constant decrease of energy intensity. If in 1989 the industry was the most energy intensive sector, in 1997 the transport sector exceeded the share of industry with nearly 15%.

The number of policies and programmes specifically aimed at promoting energy efficiency in Romania is relatively limited:

- The Governmental Emergency Ordinance (OUG) no. 63/1998, which lays down the principles for energy sector restructuring and privatisation, contains some elements placing a responsibility on utility companies to promote energy efficiency.

- Funds have been provided under the EU PHARE program, to promote energy efficiency improvements in small and medium-sized enterprises (SMEs).

- Energy efficiency standards have been introduced for most household appliances and for buildings, which adopt the EU Standards.

- Power sector modernisation has been supported from a fund created through a levy on electricity and heat sales.

1.2 Present National Energy Policy

Romania is a signatory of the Kyoto Protocol on Climate Change, and has undertaken to cut greenhouse gas emissions by 8% relative to 1989 levels by 2008-12. It has also ratified the Energy Charter Treaty, in August 1997.

The number of policies and programmes specifically aimed at promoting energy efficiency in Romania is relatively limited:

In general, Romania is obliged to comply with the E.U. legislation and provisions of the Energy Charter Treaty in order to gain entry into the E.U. According to the "Commission Report COM (2001) 700 final - SEC (2001) 1753" the Commission considers that there has been a very inconsistent evolution in the energy sector in Romania since the last evaluation (2000). This sector has been the subject of contradictory decisions and progress has been limited. Although there has been progress on legislation to promote energy efficiency, the low level of energy efficiency remains a problem.

During the transition period, Romania chose a gradual economic liberalisation policy, an option motivated by the necessity to reduce social pressure. However, this policy was not supported by proper legislation and by other measures of the economic reform.

Improving energy efficiency is clearly defined as a key element in the Romanian energy policy. The Romanian government recognised that energy intensity is high, nearly twice as high as in developed market economy and that improved energy efficiency has indirect benefits on the economy due to the improvement of foreign trade balance, given the fact that Romania imports some 40% of its energy needs, the environmental benefits and the improvement of competitiveness of industrial products on domestic and international markets.

Some of the main tasks and responsibilities of ARCE are: a) to co-operate with the authorized institutions in order to prepare the energy balance sheets as well as to create energy databases necessary for the evaluation of the demand – supply relationship in the energy field, b) to develop short, medium and long term scenarios for the evolution of this relationship, including the computing of the energy efficiency indicators;

In order to enforce the application of the provisions which refer to energy audits and energy management within *The Law No. 199/2000 for the efficient utilisation of energy*, a couple of regulations were issued and will soon be endorsed by the Ministry of Industry and Resources. These Regulations are:

1. Regulation to authorise the natural and legal persons who are entitled to elaborate energy audits (to be adopted).

2. Regulation to authorise the responsible persons who have attributions in the field of energy management (to be adopted).

Furthermore, a number of other pieces of secondary legislation have to be issued until the enforcing date of these regulations (guides, manuals, and prescriptions).

The **Energy Efficiency Law no 199/2000** also treats the following issues:

- Institutional structures for energy conservation, their rights and responsibilities;
- Financing sources for energy conservation;
- Economic mechanisms stimulating development of energy conservation;
- Areas, in which norms and standards regulating energy consumption, should be introduced;
- Economic sanctions for exceeding the established energy consumption rates and so on.

One priority of the national energy efficiency policy is to introduce EU – compatible standards related to industry consumption, combustion processes, household appliances, heating and insulation norms, efficiency norms for motor vehicles etc.

The main objective of the national energy saving policy is to obtain the maximum benefit at any level of the energy conversion sequence, including generation, conversion, transportation, distribution and consumption of different energy forms.

2 Energy Audit Programmes

At present, there is not any pure Energy Audit Programme at a national level in Romania.

3 Other Programmes with Energy Audits

There are no presently any national programmes with Energy Audits running in Romania.

4 Other Activities including Energy Audits

4.1 Legal Framework of Energy Efficiency Policy in Romania

4.1.1 Goals – Short description

The legal framework of energy efficiency policy in Romania concerns the industrial and building (public and private buildings) sector. The governmental decision HG no. 647/2001 approved the national medium-term strategy for the Romanian Energy Sector Development 2001 - 2004. The principal objective of this national strategy for energy sector development consists of "the creation of an efficient energy market, the development of which will be achieved in a sustainable manner, under conditions of high quality and security in energy supply, respecting the standards of the European Union and with reference to efficient energy use and environmental protection."

4.1.2 Administration

Law no.199/2000 is the basic legislation regarding the efficient use of energy for energy audits. At present, this law is lacking a secondary legislation necessary for its application. The national policy for the efficient use of energy is developed by the Romanian Agency for Energy Conservation (ARCE) together with the Ministry of Industry and Resources and it is submitted to the Government, together with the national energy policy, as a part of it.

4.1.3 Implementing Instruments

The principal objectives and priorities of the strategy include major decisions for the long-term development in the energy sector in the domain of efficient energy use and use of renewable sources. As such, a number of projects are to be launched:

- the establishment of a national energy observer, with the legal purpose of providing data relating to energy production and consumption.
- the improvement of energy management with the aim of creating the necessary conditions to set up and ensure the authorisation of persons qualified to manage energy issues.
- the rational use of electricity and gas in industry.
- the establishment of energy efficiency demonstration zones in Ploiesti and Craiova with the financial support of the government, the European Union and the Global Environment Fund (GEF).
- the implementation of a national programme aimed at controling and metering thermal energy (heat) for consumers connected to urban district heating networks, with the cooperation of the European Union.
- the establishment of a Romanian Energy Efficiency Fund to sustain investment projects, with the cooperation of GEF and the World Bank; the reduction in the cost of thermal energy for the general public in mountain regions by substituting fuel oil with biomass.
- the extension of the investment programme started with the cooperation of EBRD with the aim to extend the rehabilitation of district heating networks to other towns.
- the application of the European Union directives for household appliances and small-capacity boilers.

The Decision identifies that one of the instruments necessary to meet the principle objectives of the national energy strategy is to establish energy services and to increase the role of the Romanian Energy Conservation Agency. The energy sector could and should benefit from the potential of reducing greenhouse gas emissions, through flexible mechanisms promoted by the United Nations' Kyoto Protocol on climate change.
According to the national policy, the following relevant provisions are icluded in the Law:

- Any company, with an annual energy consumption of more than 1.000 tones of oil equivalent, is obliged to develop its own programme of energy efficiency, which must include:

- short term measures that are cost free or of minimal cost, i.e. measures that do not involve major investments;

- long term measures (3 - 6 years) must be included in an investment programme for which feasibility studies shall be developed.

The fuel and energy generating, transmission and distribution companies are obliged to apply measures for:

- reduction of energy consumption;
- promotion of solar, wind and biomass energy;
- organisation and demonstration of promotional actions for energy saving measures.

The main implementing instruments, referring especially to industrial sector are the following:

- Subsidies or financial encouragement from the state, for energy efficiency investments;
- Reduction in the barriers against energy efficiency promotion, thus stimulating investments;
- Promotion of financial mechanisms as an initiative in energy conservation area;
- Support of fundamental and applied research on energy conservation;
- Reduction in energy consumption per unit GDP;
- Increase in energy efficiency in all sectors of the national economy;
- Introduction of new energy efficient technologies;
- Reduction in the environmental impact resulting from generation, transport, distribution and consumption in all energy forms.
- Promotion of more energy efficient technologies which are economically viable and non polluting;
- Promotion of small and medium size co-generation and necessary measures to increase the efficiency in heat generation, transport, distribution to consumers, etc.;
- Education, training and awareness for consumers using different forms of energy, aiming at the reduction of energy consumption;
- Promotion of private initiatives and development of energy services;
- Promotion of new energy sources;

Strategic and Management Schemes

- Co-operation among consumers, producers, suppliers of energy and public authorities to achieve the objectives declared by the national energy conservation policy;
- Co-operation with other countries on energy saving activities;
- Achievement of medium and long term scenario related to energy demand in order to clarify decision making process;
- Application of technical regulations and national energy efficiency standards which are targeted to the generation of more energy efficient equipment;
- Elaboration of energy balances and development of energy data base for the evaluation of energy demand;
- Establishment of specialised department on energy conservation at the relevant structures and levels, with well-trained staff capable of elaborating, implementing and monitoring energy saving programmes;
- Evaluation of the environmental impact.

Furthermore, as far as the building's sector is concerned, the following measures must be followed:

- Consumers who use more than 200 tones of oil equivalent per year are obliged to perform an energy balance sheet, every 2 years, conducted by an authorized person.

- Consumers who use more than 1.000 tones of oil equivalent per year are obliged to:
  a) Appoint a person to be in charge of energy efficiency management;
  b) Annually perform an energy balance sheet, by an authorized person;
  c) Develop measures aimed at the reduction in energy consumption, including investments for which feasibility studies have been developed.

- The authorities of communities with population of more than 20,000 inhabitants are obliged to develop their own energy efficiency programmes, according to the provisions of art. 5 par. (1).

- The administrators of public buildings are obliged to take actions, every 5 years, regarding (including the completion of an energy balance sheet) buildings of an even area of more than 1500 m^2, by an authorized person;

The energy consumers are obliged to:

- Respect technical regulations and national standards for the design, construction, operation, maintenance and repair of energy installations;

- Have a proper monitoring system of energy consumption and to provide information related to energy consumption and energy indicators to qualified institutions.

The managers of public buildings are obliged to apply measures for:

- Efficient use of heating and cooling system;

- Use of energy efficient building materials;

- Rational use of artificial lighting;

- Use of monitoring and control devices for energy consumption;

- Increased energy efficiency in accordance with national regulations.

- Energy audits to buildings with a surface larger than 1,500 m^2;

4.2 Monitoring and Targeting in Key Industrial Sectors

4.2.1 Goals – Short description

This project was realised within the framework of **PHARE**, during the period 1998 – 1999. It involved the continuous monitoring of three selected industrial companies, which represented different sectors, the engineering, metallurgy and ceramic sector. The main objective of the project was the demonstration of the Monitoring and Targeting (M&T) benefits through their implementation on key industrial sectors.

4.2.2 Administration

The administration and implementation of this project was carried out by the Romanian Agency for Energy Conservation (ARCE).

4.2.3 Auditors' Tools

An energy management software was installed at each of the three selected industrial companies. The energy managers of the three different industrial companies have been taken trainning courses on how to use the energy management software and especially on how to set performance targets.

4.2.4 Monitoring

Weekly energy reports and monthly meetings with consultants and energy managers have been taken place in order to discuss the sites specific energy consumption as well as the actions to improve the overall companies energy consumption.

4.2.5 Auditing Volumes

Three industries have been chosen to undergo Monitoring and Targeting (M&T), which belong to engineering, metallurgy and ceramic sector.

4.2.6 Evaluation

After the completion of the project, a series of case studies, seminars and training workshops have been carried out at five industrial centres in order to inform energy managers, technical staff and consultants about the results of the specific programme as well as the benefits of applying M&T in order to improve energy consumption.

4.3 Schemes and Measures to Implement in Romania the Specific Energy Saving Long Term Agreements in Industry

4.3.1 Goals – Short description

This project was developed within the framework of **SAVE II**, during the period 1998 – 2000. It involves negotiated targets for achieving emission reductions, voluntary adoption of high-energy efficiency products or processes, co-operative R&D efforts and agreements to monitor and report emission reductions based on voluntary actions. The objective of this project was to:

- Identify the potential partners for the application of industrial long-term agreements in Romania.
- Analyse the possibilities for long-term agreements in Romania
- Analyse the effectiveness of long-term agreements in E.U

4.3.2 Administration

The administration of the aforementioned project was carried out by a large R&D institute in Bucharest, ICEMENERG along with the ***Romanian Agency for Energy Conservation (ARCE)***.

4.3.3 Target sectors

The industrial sector was the main target of this project.

4.4 Energy Action Plan for Black Sea Region

4.4.1 Short description - Golas

This project was realised within the framework of **SYNERGY** programme, during the period of April 1995 - September 1997. It was structured on short and long-term action plans for the:

- Determination of energy consumption levels and assessment of the potential areas for energy saving achievements. It involved the implementation of regional audit programmes for industries, housing facilities and public buildings
- Development of awareness campaigns for public and commercial building managers
- Implementation of an energy policy for public and municipal buildings (energy audits, assessment of energy savings)
- Implementation of a programme to install heat meters in district heating networks in order to highlight the actual consumption of the end-users.

4.4.2 Target Sectors

This project targeted the municipal and public buildings as well as the industrial and residential sector.

4.4.3 Results

This project resulted in a specific documentation for:

- models for energy audits in industry
- the preparation of the bankable documentation for energy efficiency projects

4.5 PUBLIC - Energy Efficiency in Public and Municipal Buildings

4.5.1 Short description - Goals

The above project was developed within the framework of ECOS-OUVERTURE - PHARE - Urban and Regional Energy Efficiency, during the period January 1997 - April 1998. This project targeted the building sector and involved six energy audits in several buildings of Craiova (Prefecture Palace of Dolj County, General School No.17 Romanesti, High School "Traian Vuia", Student Hostels of the Faculty of Agronomy, Sport Hall (Faculty of Physical Education), Elderly-house Craiova) as well as thirty walk-through energy audits at schools, universities, hospitals, culture & sport centers and 9 public administration buildings.

4.5.2 Auditing Volumes

This project involved six energy audits in buildings at Craiova (Prefecture Palace of Dolj County, General School No.17 Romanesti, High School "Traian Vuia", Student Hostels of the Faculty of Agronomy, Sport Hall (Faculty of Physical Education), Elderly-house Craiova) as well as thirty walk-through energy audits at 8 schools and high schools, 7 universities, 4 hospitals, 2 culture & sport centres and 9 administration buildings.

4.6 ENEFBALKO Initiative

4.6.1 Short description - Goals

The above project was developed within the framework of PHARE Multi Country Networking / Twinning for Energy Efficient Organisations, during the period April 1997 - April 1998 targeted all public buildings.

4.6.2 Results

- Improvement of SOCER's expeperts' skills
- Methodology and models for energy auditing in public buildings (school, hotel, hospital, commercial area)
- Bioclimatic design of the buildings
- Integration of RES in buildings
- Know-how transfer related to energy efficient technologies (cogeneration systems)

4.7 Increase of SOCER energy auditing capacity

4.7.1 Short description - Goals

The above project was developed within the framework of Five Years Development Assistance Programme of the Greek Government, during the period January 1999-December 1999. This project aimed at the improvement of the energy efficiency of buildings heating system through the implementation of energy audits in several schools of the Craiova municipality.

4.7.2. Administration

The project was implemented by the Hellenic Agency for Local Development and Local Government – EETAA. The electricity and heat measurements and the energy audit have been executed by the experts from SOCER together with an expert from the Greek company EXERGIA, under the supervision of EETAA's expert. Specialists from the UNESCO Chair (Politehnica University - Bucharest) have also participated in the implementation of the energy measurements. Some of the actions that were initiated by SOCER in 1999 and developed in co-operation with the UNESCO Chair and ARCE (Romanian Agency for Energy Conservation) involved:

- Detailed configuration of the methodology for the energy analysis of the buildings
- Elaboration of a model for **Energy Profile Form of the Building**, referring to public buildings

4.7.3 Auditing Volumes

Sixteen elementary schools, high schools and professional schools built in the period 1895 – 1990 have been selected and undergone energy audits. The energy analysis involved two levels:

- First level – preliminary energy analysis (14 schools)
- Second level – implementation of energy measurements in 9 schools and analysis of the data referring to their boilers systems

4.7.4 Results

Conclusions of the First Level energy analysis:

- The electricity consumption represents less than 10% of the total energy consumption (any higher values are attributed to exceptional situations); the rest of 90% is used for the heating of the buildings

- The specific heat consumption is different from one school to another, depending on the construction year:

19 kWh/m^3 for the Professional School “Charles Vangier” built in 1853

28 kWh/m^3 for the School No.17 (1965)

34 kWh/m^3 for the High School of Beaux-Arts “Marin Sorescu” (1967)

45 kWh/m^3 for the Professional School for Deaf Handicaps (1984)

- In some cases, the consumption for two consecutive years (1997, 1998), varied significantly although the consumption data were referring to the same heating period and to similar conditions as far as the external average temperature is concerned:

School No.19: 33.83 kWh/m^3 (1997) and 51.34 kWh/m^3 (1998)

School No.17: 31.25 kWh/m^3 (1997) and 70.10 kWh/m^3 (1998)

Conclusions of the Second Level energy analysis:

- In the majority of the cases, the efficiency of the boilers was less than the values guaranteed by the manufacturers. This situation was due to the large excess in combustion air.

- The temperature of the hot water re-circulated in the central heating system was not correlated with the external temperature.

In general, the main results of the overall project were:

- The first priority measures concerning the improvement of the energy efficiency must be focused mainly on the production and use of heat

- The additional fuel consumption needed to supplement the low energy efficiency of the boilers is estimated to be about 7% (this percentage is equivalent to an annual supplementary consumption of 84.000 Nm^3 of natural gas)

- In some cases the energy management is inadequate.